Appendix E – ARBO Project Design Criteria

Aquatic & Riparian Restoration Programmatic Consultation – Project Design Criteria for Culvert Installation and Road Decommissioning

Road decommissioning activities and placement of the new culverts would be consistent with Region 6 fish passage guidance and in accordance with the Regional General Permit issued by the U.S. Army Corps of Engineers. Minimization measures for fisheries, watershed function, water quality, and soil conditions include those identified in the National Marine Fisheries Service (NMFS) 2008 and U.S. Fish and Wildlife Service (FWS) 2007 Aquatic Restoration Programmatic Biological Opinion (ARBO) as well as design criteria developed by the Blue Mountain Ranger District interdisciplinary team. The ARBO PDCs specific to this project will be implemented as described in the NMFS 2008 and FWS 2007 ARBOs regardless of any changes that may occur through subsequent revisions. ARBO measures specific to this proposed project are identified below.

GENERAL PRACTICES AND REQUIREMENTS

Technical Skill and Planning Requirements

Ensure that an experienced professional fisheries biologist, hydrologist or technician is involved in the design of all projects covered by this consultation. The experience should be commensurate with technical requirements of a project. If ESA-listed wildlife or plant species occur in the planning area, as determined by a unit wildlife biologist or botanist, the appropriate specialist will assist with project design.

1. Planning and design include field evaluations and site-specific surveys, which may include reference reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involve appropriate expertise from professional staff or experienced technicians (e.g. engineer, silviculturist, fire and fuels specialists.)
2. The project biologist shall ensure that design criteria and conservation measures are incorporated into any implementation contract agreements. If a biologist is not the contracting officer's representative (COR), then the biologist must regularly coordinate with the project COR to ensure the design criteria and conservation measures are being followed.

State and Federal Requirements

1. Follow the appropriate state (ODFW or WDFW) guidelines for timing of in-water work. Exceptions to ODFW and WDFW in-water work windows must be requested and granted from the appropriate state agency. Exceptions can be approved through documented phone conversations or email messages with the state agencies. Such guidelines have been developed to prevent project implementation in fish spawning habitat when spawning is taking place or while eggs and alevins are in gravel.
2. Project actions will follow all provisions and requirements (including permits) of the Clean Water Act for maintenance of water quality standards as described by Oregon Department of Environmental Quality.
3. All regulatory permits and official project authorizations will be secured prior to project implementation.

Pollution and Erosion Control Plans (PECP)

The Action Agencies will develop and implement a PECP for each authorized project. The PECP will include methods and measures to minimize erosion and sedimentation associated with the project. The following measures will assist in the creation of a PECP:

1. Spill Prevention Control and Containment Plan (SPCCP) – The contractor will be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc). The SPCCP shall contain a description of the hazardous materials that will be used, including inventory, storage, handling procedures; a description of quick response containment supplies that will be available on the site (e.g., a silt fence, straw bales, and an oil-absorbing, floating boom whenever surface water is present).
2. The PECP shall be included in construction contracts or force account work plans.
3. The PECP must be commensurate with the scale of the project and include the pertinent elements listed below

    a) Minimize Site Preparation Impacts

        i. Establish staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc.) beyond the 100-year floodplain in a location and manner that will preclude erosion into or contamination of the stream or floodplain.

        ii. Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Stockpile large wood, trees, vegetation, sand, topsoil and other excavated material, that is removed when establishing area(s) for site restoration.

        iii. Materials used for implementation of aquatic restoration categories (e.g. large wood, boulders, fencing material etc.) may be staged within the 100-year floodplain.

        iv. Prior to construction, flag critical riparian vegetation areas, wetlands, and other sensitive sites to prevent ground disturbance in these areas.

        v. Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Maintain barriers throughout construction.

        vi. Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees within riparian areas when they pose a safety risk. If possible, fell trees towards the stream. Keep felled trees on site when needed to meet coarse woody debris objectives.

    b) Minimize Heavy Equipment Impacts

        i. The size and capability of heavy equipment will be commensurate with the project.

        ii. All equipment used for instream work shall be cleaned and leaks repaired prior to entering the project area. Remove external oil and grease, along with dirt and mud prior to construction. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands.

        iii. All equipment shall be cleaned of all dirt and weeds before entering the project area to prevent the spread of noxious weeds.

iv. Equipment used for instream or riparian work shall be fueled and serviced in an established staging area outside of riparian zone. When not in use, vehicles shall be stored in the staging area.

v. Minimize the number and length of stream crossings and access routes through riparian areas. Crossings and access routes should be at right angles. Stream crossings shall not increase risks of channel re-routing at low and high water conditions and shall avoid potential listed fish spawning areas when possible.

vi. Existing roadways or travel paths will be used whenever reasonable. Minimize the number of new access paths to minimize impacts to riparian vegetation and functions.

vii. Project operations must cease under high flow conditions that inundate the project area, except for efforts to avoid or minimize resource damage.

viii. Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Operate heavy equipment in streams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic and riparian ecosystem relative to other alternatives.

a) Site Restoration

i. Upon project completion, remove project related waste.

ii. Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials, seeding, and/or planting with local native seed mixes or plants. Planting shall be completed no later than spring planting season of the year following construction.

iii. Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

iv. All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

v. When necessary, loosen compacted areas, such as access roads, stream crossings, staging, and stockpile areas.

ARBO PROJECT DESIGN CRITERIA (PDC) SPECIFIC TO THE GALENA PROJECT

5. Fish Passage Culvert Projects

Description

The Action Agencies propose to remove or replace existing road culverts that restrict fish passage and natural flows with stream simulation structures to restore up- and downstream fish passage for all life stages of native fish. Replacements of existing structures that do not restrict fish passage are permissible.

Construction would involve use of heavy equipment, such as excavators, cranes, backhoes, front-end loaders, dump trucks, bull dozers, and on occasion pile-drivers and helicopters.

Design Criteria

1. Fish passage projects will be designed by an experienced engineer with design input from an experienced fish biologist and hydrologist. Such personnel shall oversee or review the project during construction to ensure that project designs and conservation measures are being properly implemented.
2. Forest Service Design Assistance Teams will provide design review for projects that exceed $100,000 or will result in structures that are greater than 20 feet wide.
3. Assess sites for a potential to head-cut below the natural stream gradient. Projects that lead to head-cutting below the natural stream gradient are excluded from this consultation.
4. Design Standards
    a. Structure Type – Structure types include closed-bottomed culverts, open-bottomed arch culverts, and bridges. Structure material must be concrete or metal.
    b. Structure Width – The structure width shall never be less than the bankfull channel width. (The stream width inside the culvert or between bridge footings shall be equal to or greater than the bankfull width.) The minimum structure width and height for a closed bottom culvert shall be 6 feet to allow manual placement of stream simulation material. Structures must accommodate a 100-year flood flow while maintaining sediment continuity (similar particle size distribution) within the culvert as compared to the upstream and downstream reaches. To meet this requirement, unconfined channel types (Rosgen C, E, and B channel types (Rosgen 1996)) may require structures wider than bankfull and/or the addition of flood relief culverts or other comparable flood relief methods.
    c. When possible, flood relief culverts will be designed to restore and maintain access to off-channel rearing and high flow areas for juvenile and adult fish. Therefore, existing floodplain channels should be the first priority for location of flood relief culverts which should be installed in a manner that matches floodplain gradient and does not lead to scour at the outlet.
    d. Channel Slope – The structure slope shall approximate the average channel gradient of the natural stream up- and downstream of the structure. The maximum slope for closed-bottomed culverts shall not exceed 6 percent because of difficulties in retaining substrate in the culvert at higher gradients. Open-bottom arches can be placed in channel gradients that exceed 6 percent.
    e. Embedded Culvert – If a closed culvert is used, the bottom of the culvert shall be buried into the streambed not less than 30 percent and not more than 50 percent of the culvert height. For open-bottomed arches and bridges, the footings or foundation shall be designed to be stable at the largest anticipated scour depth. Substrate and habitat patterns within the culvert should mimic stream patterns that naturally occur above and below the culvert. Coarser material may be incorporated to create velocity breaks during high flows, thereby improving fish passage, and to provide substrate stability.
    f. Riprap – The use of riprap is permissible above bankfull height to protect the inlet or outlet of new culverts or open-bottomed arches. If the use of riprap is required for culvert stability, then an additional analysis may be required to ensure that the structure is not undersized. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings for bridges. However, the amount and placement of riprap around the abutments and/or pilings should not constrict the bankfull flow.

g. Grade Control Structures – Grade control structures are permitted to prevent head-cutting above or below the culvert or bridge. Grade control typically consists of boulder structures that are keyed into the banks, span the channel, and are buried in the substrate.

h. Where applicable, incorporate road dips into crossing designs, to ensure catastrophic flood events will transport overflow back into the downstream channel instead of the road bed.

i. Structures containing concrete must be sufficiently cured or dried before they come into contact with stream flow.

j. In cases of structure removal or when removing an existing structure and replacing it with a bridge, consideration should be given to restoring the stream channel and reconnecting the floodplain at the site.

k. When removing woody debris from the road-crossing inlet, place the debris downstream of the road crossing.

l. Monitor structures after high flow events, which occur during the first fall/winter/spring after project completion. Assess the following parameters: head-cutting below natural stream gradient, substrate embeddedness in the culvert, scour at the culvert outlet, and erosion from sites associated with project construction. Apply remedial actions (using project design criteria and conservation measures) if projects do not meet the intended goals.

m. If other aquatic restoration activities are used as complementary actions, follow the associated design criteria and conservation measures.

Conservation Measures

Along with the General Practices and Requirements summarized at the beginning of this section, the following conservation measures will be used to minimize sediment and turbidity and the effects of fish handling/transport:

1. Isolate construction area and remove fish from project area. Fish shall be removed from project area (see fish capture guidelines below).

2. Dewater Construction Site – Upstream of the isolated construction area, coffer dams (diversions) constructed with non-erosive materials are typically used to divert stream flow with pumps or a by-pass culvert. Diversions constructed with material mined from the streambed or floodplain is not permitted. Pumps must have fish screens and be operated in accordance with NMFS fish screen criteria. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, (i.e., is not screened), place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. When necessary, pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

3. Stream Re-Watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden increase in stream turbidity. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

4. Fish Handling – If capture, removal, and relocation of fish are required, follow these steps:

   a) All fish capture, removal, and handling activities shall be conducted by an experienced fisheries biologist or technician.

   b) Isolate capture area – Install block nets at upstream and downstream locations and leave in a secured position to preclude fish from entering the project area. Leave nets secured to the

stream channel bed and banks until fish capture and transport activities are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.

c) Fish Capture Options

i. Collect fish by hand or dip nets, as the area is slowly dewatered.

ii. Seining – Use seine with mesh of such a size to ensure capture of the residing ESA-listed fish.

iii. Minnow traps – Traps will be left in place overnight and in conjunction with seining.

iv. Electro-fishing – Prior to dewatering, use electro-fishing only where other means of fish capture may not be feasible or effective. The protocol for electro-fishing includes the following:

1. If fish are observed spawning during the in-water work period, electro-fishing shall not be conducted in the vicinity of spawning adult fish or active redds.
2. Only Direct Current (DC) or Pulsed Direct Current (PDC) shall be used.
3. Conductivity <100 use voltage ranges from 900 to 1100. Conductivity from 100 to 300 then use voltage ranges from 500 to 800. Conductivity greater than 300, then use voltage to 400.
4. Begin electro-fishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
5. Do not allow fish to come into contact with anode. Do not electro-fish an area for an extended period of time. Remove fish immediately from water and handle as described below. Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
6. Handling and Release –Fish must be handled with extreme care and kept in water for the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place larger fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. As rapidly as possible (especially for temperature-sensitive bull trout), but after fish have recovered, release fish upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Document all fish injuries or mortalities and include in annual report.

17. Road Treatments

Description

The Action Agencies propose decommissioning or obliteration of roads to restore watershed function. This activity includes road decommissioning, from simple closures to more complex road obliterations, with an overall goal of restoring hydrologic functions. This category also includes stormproofing roads intended to remain open (hydrologically disconnecting such roads from watershed streams). Associated benefits include the following: Eliminating or reducing erosion and mass-wasting hazards associated with roads; eliminating or reducing human access and use-disturbance associated impacts to aquatic systems. Actions such as bridge and culvert removal, removal of asphalt and gravel, subsoiling or ripping of road surfaces, outsloping, waterbarring, fill removal, sidecast pullback, re-vegetating with native species and placement of large woody material and/or boulders are included. Roadway barricading to exclude

vehicular traffic is covered only if the overall road remediation project substantively addresses restoration of hydrologic function. For culvert removals on closed roads, limited cutting or removal of vegetation on the closed road-bed to access the culvert site may be required. Construction would involve use of heavy equipment, such as excavators, backhoes, front-end loaders, dump trucks, and bull dozers.

Design Criteria

1. For road removal projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the greatest degree possible.
2. For those road segments immediately adjacent to the stream or where the road fill is near the wetted stream, consider using sediment control barriers between the project and the stream.
3. Drainage features should be spaced to hydrologically disconnect road surface runoff from stream channels.
4. Dispose of slide and waste material in stable sites out of the flood prone area. Waste material other than hardened surface material (asphalt, concrete, etc) may be used to restore natural or near-natural contours.
5. Minimize disturbance of existing vegetation in ditches and at stream crossings to the greatest extent possible.
6. Conduct activities during dry-field conditions – low to moderate soil moisture levels.
7. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should follow the isolation criteria as described in Activity #5 above. Culvert removal on fish bearing streams shall adhere to the measures describe in #5 above.
8. For culvert removal projects, restore natural drainage patterns and when possible promote passage of all fish species and life stages present in the area. Evaluate channel incision risk and construct in-channel grade control structures when necessary.
9. If other aquatic restoration activities are used as complementary actions, follow the associated design criteria and conservation measures.